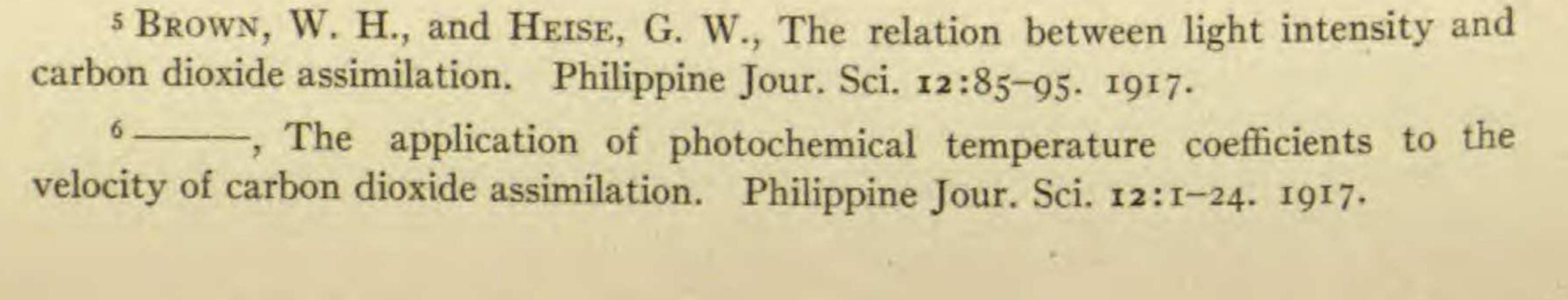venter which lies below the surface of the prothallium and a straight neck which projects as a short tube beyond the surface. The organization of the axial row was not worked out in detail. One figure shows an archegonium with an egg and two free nuclei in the neck canal.

In minor features the two genera differ. In *Tmesipteris* the archegonia are much more numerous than the antheridia, while in *Psilotum* the reverse is true. The archegonia and antheridia of *Tmesipteris* are about twice the size of those of *Psilotum*. The statement that the gametophyte generation of the Psilotaceae bears no structural resemblance to the prothallium of *Lycopodium* or *Equisetum* seems peculiar. We readily agree that there is no suggestion of *Equisetum* characteristics, but both the descriptions and the numerous excellent figures constantly remind one of *Lycopodium*, especially of the *L. Phlegmaria* type. LAWSON closes with the remark that no new facts were revealed which would discount the view, now generally held, that the Psilotaceae are more nearly related to the extinct Sphenophyllales than to any other known group of pteridophytes. This may be true, for the prothallia of the Sphenophyllales are entirely unknown and probably will remain so; but if they should be discovered, we should expect them to be of the *Equisetum* type. As far as the evidence of prothallia goes, we should guess that it indicates relationship with the Lycopodiales. The investigation of the embryogeny will be awaited with interest, since it will have a more definite bearing upon the problem of relationships.—CHARLES J. CHAMBERLAIN.

Photosynthesis.—BROWN and HEISE[5] have made a careful study of the experiments of various investigators on the relation of light intensity to photosynthetic rate. They conclude that "the published work on photosynthesis does not warrant the general conclusion that carbon dioxide assimilation in plants is proportional to the light intensity. Instead they indicate a progressively smaller augmentation of the rate of assimilation for each increase in light intensity. This decrease in rate of augmentation continues until a point is reached at which further increase in light produces no measurable increase in assimilation."

BROWN and HEISE[6] have also scrutinized the literature on the effect of temperature on photosynthetic rate and have come to the following surprising conclusions. The temperature coefficients (Q_{10}) lie between 1 and 1.4. They are smaller than those for most vital phenomena which have values agreeing with the Van't Hoff law. These coefficients are of a magnitude that indicates that photosynthesis is a purely photochemical process.

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[5] BROWN, W. H., and HEISE, G. W., The relation between light intensity and carbon dioxide assimilation. Philippine Jour. Sci. 12:85–95. 1917.

[6] ———, The application of photochemical temperature coefficients to the velocity of carbon dioxide assimilation. Philippine Jour. Sci. 12:1–24. 1917.

These conclusions are quite out of accord with those of the principal investigators in this field. KANITZ,[7] in his monograph on temperature and life processes, gives the following table, calculated from the experiments of MATTHAEI on the cherry laurel leaf, probably the most nearly error-free piece of work done upon carbon assimilation as effected by temperature.

Temperature	Assimilation CO_2	Q_{10}
−6	0.2	
0	1.75	28.7
10	4.2	2.4
20	8.9	2.12
30	15.9	1.76
37	23.8	1.81
40.5	14.9	0.23

KANITZ points out that the Van't Hoff law applies between 0 and 37° C. He also emphasizes the fact that the coefficient is excessive near the minimum temperature for the process and too small near the maximum, as is true for vital processes generally. The coefficients give no indication that photosynthesis is a purely photochemical process. BAYLISS[8] classifies it as a complex photochemical reaction with increased energy; it results from the combination of purely chemical reactions with photochemical effects. The purely chemical phases seem to be the rate-determining portion, hence the high temperature coefficients. BOVIE[9] gives a similar interpretation of the high temperature coefficients of the process.

The authors misquote KANITZ's formula for calculating Q_{10}. DENNY's review, upon which they depended, misquotes it, due to a typographical error, but they have altered it still further.

NYBERGH attempted to show that photoperception in plants is purely photochemical. His main proof was the small temperature coefficient. DE VRIES has since shown that the coefficient is relatively large and that the process obeys the Van't Hoff law from 10 to 30°C.

It is possible that too much emphasis has been placed upon the size of the temperature coefficient as evidence for the chemical or physical nature of processes in the organism.[10] In the organism, the process often consists of a great number of individual chemical reactions and its rate is the resultant of the rates of all of them. On the other hand, we cannot have too many data on the effect of temperature (or any other factor) on the rate of vital processes or know too much about temperature coefficients which express this effect.–WM. CROCKER.

[7] KANITZ, ARISTIDES, Temperatur und Lebensvorgange. Berlin. 1915.

[8] BAYLISS, W. M., Principles of general physiology (pp. 553–556). London. 1915.

[9] Science N.S. 37:373–375. 1913.

[10] LEITCH, I., Some experiments on the influence of temperature on the rate of growth in *Pisum sativum*. Ann. Botany 30:25–46. 1916.